

CLAIMS

Claim 1. (Canceled)

2. (Currently Amended) A method of cooling a surface by nucleate boiling, comprising:

polishing said surface;

photo etching said surface to obtain a predetermined minimum surface density of discrete nucleation sites having a conical cross-section tapering to at least a minimum predetermined depth;

immersing said surface in a refrigerant having a preselected boiling point so that said nucleation sites become substantially flooded by said refrigerant; and

permitting said surface to heat up to a temperature of at least said preselected boiling point, said heating initiating nucleate boiling of said refrigerant without a temperature overshoot on the initial ascent, wherein said conical cross-section has a cavity cone angle, θ , which is greater than the liquid contact angle, γ , of said refrigerant, and said nucleate boiling initiates with a reversal of trend of less than about 2°C.

Claims 3-4. (Canceled)

5. (Previously presented) The method of claim 2, wherein said refrigerant has a liquid contact angle of less than about 5°.

Claims 6 to 9. (Canceled)

10. (Currently Amended) A method of cooling an electronic component having at least one electronic chip means thereon, comprising:

photo etching a back surface of said chip means to provide thereon a predetermined minimum surface density of discrete, nucleation sites, each having a conical cross-section tapering to at least a minimum predetermined depth;

immersing said back surface of said chip in a refrigerant having a preselected boiling point so that said nucleation sites become substantially flooded by said refrigerant;

operating said electronic component so that said back surface of said chip is heated to at least said boiling point, said heating initiating nucleate boiling of said refrigerant without a temperature overshoot on the initial ascent and with a reversal of trend of less than 2°C.

11. (Previously presented) The method of claim 10, wherein said nucleation sites comprise spaced reverse-pyramidal cavities lying substantially on the same plane and having a first dimension of less than about 10 μ m.

12. (Previously presented) The method of claim 11, wherein said nucleation sites include a spacing of less than about 60 μ m.

13. (Previously presented) The method of claim 11, wherein said nucleation sites include a spacing of less than about 40 μ m.

14. (Previously presented) The method of claim 11, wherein said nucleation sites include a spacing of less than about 20 μ m.

15. (Previously presented) The method of claim 10, wherein said back surface contains a mirror-polished region including a plurality of nucleation sites having substantially the same geometric configuration.

16. (Previously presented) The method of claim 12, wherein said nucleation sites comprise inverted square pyramids having a side dimension of at least about 10 μ m and a depth greater than 5 μ m.

Claims 17 to 37 (Canceled)